

## Remarks

### I. Status of the Application and Claims

As originally filed, the present application had a total of 16 claims. All of these have now been canceled and new claims 17-33 have been introduced. An Office Action has been issued in which all of Applicants' original claims were rejected.

### II. The Amendments

The abstract and specification of the application were amended to better conform to standard practice in the United States. The abstract was shortened to a single paragraph and new headings were introduced in several places in the specification. In addition, a section cross referencing related applications was added and a brief description of the figures was introduced on page 6. Support for the latter may be found on page 19 of the application as filed.

Support for new claims 17-23 may be found in original claim 1. Additional support for certain aspects of the claims may be found on page 25, lines 23-24 and on page 31, lines 33-34.

Support for new claims 24-26 may be found on page 5 of the specification, line 25-page 6, line 2.

Support for new claims 29 and 31-33 may be found on page 12 of the specification, line 12-page 13, line 19.

Support for new claims 30-32 may be found on page 18 of the specification, lines 20-25.

Claims were also amended to introduce transitional phrases typically used in the United States and to introduce functional limitations relating to the transaldolase enzyme. These limitations were introduced in direct response to allegations by the Examiner that claims are overly broad because they fail to have a limitation of this type.

None of the amendments described above add new matter to the application and their entry is therefore respectfully requested.

### **III. Specification Informalities**

On page 2 of the Office Action, the Examiner objects to certain informalities in the specification. Specifically, it is alleged that the abstract is too long, and that Applicants have failed to properly cross-reference a provisional application relied upon for priority. These errors have now been corrected by the amendments discussed above.

### **IV. Claim Objections**

On page 3 of the Office Action, the Examiner makes objections with respect to claims 1, 2, 5 and 6. These concern the way that sequence identification numbers have been written, certain grammatical errors and the recitation of abbreviations that are not fully defined in the claims. Applicants have introduced a new set of claims herein in which all of the alleged insufficiencies have been corrected.

## **The Rejections**

### **I. Rejection of Claims Under 35 U.S.C. § 112, Second Paragraph**

On pages 3-5 of the Office Action, the Examiner rejects claims under 35 U.S.C. § 112, second paragraph. The grounds for the rejections are set forth in items 8-17. Below, Applicants briefly respond to each allegation.

Item 8: In item 8, the Examiner objects to the phrases “polynucleotide which is complementary” and “sequence which hybridizes with the sequences complementary to.” In response, Applicants have eliminated reference to hybridization behavior and have adopted language that is essentially the same as that suggested by the Examiner with respect to complementary sequences. It is therefore submitted that this basis for rejection has been obviated.

Item 9: In item 9, the Examiner rejects claims because they recite both a broad range limitation together with a narrower range. This is no longer the case for any of the claims now pending in the application. The Examiner's rejection has therefore been obviated.

Item 10: In item 10, the Examiner alleges that claims are indefinite because they recite a variety of genes (tkt, zwf, opcA, and devB) without providing sufficient identifying characteristics. Since these nucleotide sequences are no longer recited in claims, the Examiner's rejection has been obviated.

Item 11: In item 11, the Examiner alleges that certain claims are indefinite because it is not clear whether a recited gene (tkt, zwf, opcA or devB) are part of a distinct plasmid or part of the same plasmid as genes recited in claim 1. Again, the genes referred to by the Examiner are no longer recited in the claims and this rejection has therefore been obviated.

Item 12: In item 12, the Examiner rejects claims 4 and 6, alleging that they should refer to a single nucleotide sequence rather than a plurality of sequences. In response, Applicants have eliminated the language that the Examiner found to be objectionable from the claims as presented herein. The present rejection has therefore been obviated.

Item 13: In item 13, the Examiner rejects claim 6 based upon the allegation that Applicants do not refer to the sequence identification number for SEQ ID NO:3 in the proper way. Applicants believe that this error is no longer present in the claims introduced herein.

Item 14: In item 14, the Examiner alleges that the phrase "corresponds to sequences (i) within the range of the degeneration of the genetic code" is indefinite. The Examiner suggests that this phrase be replaced with phrases referring to a "degenerate variant." In response, Applicants have introduced language which is essentially the same as that suggested by the Examiner and therefore believe that this rejection has been overcome.

Item 15: In item 15, the Examiner rejects claim 6 based upon the allegation that the term "hybridizes" is indefinite in the absence of a description of the conditions under which

hybridization is performed. Since the present claims no longer refer to hybridization, this rejection has been obviated.

Item 16: In item 16, the Examiner alleges that the phrase “sense mutations of neutral function of (i)” is indefinite. This phrase is no longer used in claims and it is therefore submitted that the Examiner’s rejection has been overcome.

Item 17: In item 17, claim 7 is rejected based upon the allegation that the phrase “a vector which carries a polynucleotide” is indefinite. The Examiner suggests replacing this phrase with “a vector comprising a polynucleotide.” Applicants believe that the present claims have language that the Examiner should find acceptable.

## II. Rejection of Claims Under 35 U.S.C. §112, First Paragraph

On pages 5-8 of the Office Action, the Examiner rejects claims under 35 U.S.C. §112, first paragraph. All of the rejections appear to be directed to the enablement requirement of patentability, with the Examiner arguing that Applicants’ claims are overly broad.

Many of the Examiner’s allegations are directed to claim language that is no longer present. Apart from this, there appear to be two main allegations. The first is that certain claims are overly broad because they encompass all polynucleotides encoding proteins that are homologous (*e.g.*, 70% identical) to certain sequence identification numbers, and many of these proteins will not be functional. In response, Applicants have amended claims so that there is now both a requirement for structural homology (*e.g.*, 80% homology) as well as a functional requirement that encoded proteins retain essentially all of their enzymatic activity. Thus, claims no longer encompass polynucleotides that encode proteins with either no transaldolase activity or with substantially reduced activity relative to the unsubstituted sequence.

The second allegation that the Examiner makes is that it would take undue experimentation for one of skill in the art to determine all of the polynucleotides encompassed by the present claims. However, this is an improper standard to use for judging

enablement. The relevant question is not whether one of skill in the art can make all of the species falling within a genus claim but rather whether such an individual can make and use each particular species. The synthesis of polynucleotides is clearly routine in the art and there is no reason to think that the making of any of the polynucleotides encompassed by Applicants' claims would be particularly difficult. Similarly, recombinant DNA techniques for introducing genes into cells and the use of such cells for the making of amino acids are well known techniques and should not require undue experimentation.

To the extent that the Examiner's rejection may be directed at the written description requirement, Applicants again emphasize that this must be judged on a species by species basis. Given a particular polynucleotide, it would be a trivial matter for one of skill in the art to determine whether it had 80 or 90% homology to a sequence recited in the present application. The only remaining question would then be whether its enzymatic activity had been substantially changed. This might, in some cases, require a side by side comparison of proteins. However, enzymatic assays for transaldolase are known in the art and it is Applicants' position that the performance of these assays would not require undue experimentation.

In light of the above considerations, Applicants submit that the rejection of claims under 35 U.S.C. §112, first paragraph has been overcome and it is respectfully requested that this rejection be withdrawn.

### **III. Rejection of Claims Under 35 U.S.C. § 102**

On pages 8 and 9 of the Office Action, the Examiner rejects claims 1, 2, 6 and 7 under 35 U.S.C. §102(b) as being anticipated by JP 09224661. The rejection appears to be based upon portions of claims which encompass polynucleotides that only have 15 successive bases corresponding to recited sequence identification numbers or which are defined based upon their hybridization behavior. Since these portions of claims are no longer present, Applicants respectfully submit that the Examiner's rejection has been obviated.

#### IV. Rejection of Claims Under 35 U.S.C. §103

On pages 9 and 10 of the Office Action, the Examiner rejects claim 3 as being unpatentable over the Japanese reference discussed above. The rejection is based upon essentially the same arguments as the §102 rejection with the main difference being that claim 3 was directed to RNA rather than DNA and therefore not anticipated. Again, the portions of claims upon which the Examiner has based his rejection have been eliminated and Applicants therefore respectfully submit that the Examiner's rejection no longer applies to the claims pending in the application.

#### Conclusion

In light of the amendments and discussion above, Applicants submit that all of the Examiner's rejections have been overcome. It is therefore respectfully requested that these rejections be withdrawn and that the claims presently pending in the application be allowed.

If, in the opinion of the Examiner, a phone call may help to expedite the prosecution of this application, the Examiner is invited to call Applicants' undersigned attorney at (703) 905-2173.

Respectfully submitted,

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